

Tested Light Source - 1_PHOT_NINETY-NINE-2000lmChip-2700K-21Deg-HoneycombLouvre_2303

Laboratory and Equipment

Laboratory Owner and Location

Goniospectrometer System and Type

Spectrometer Manufacturer and Model

Factorylux, Greenhill Mills, Hebden Bridge, HX7 5QF, UK

BaseSpion – Type C, horizontal

Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

Number of C-planes and Resolution

γ (gamma)-Resolution

Test Distance

Input Power, Power and Displ. Factors

Input RMS Voltage and Current

Frequency of Input Power

32 planes – 11.25°

1°

1.50 m

16.0 W – PF 0.98 – DPF 0.98

240 V – 0.068 A

50.1 Hz

Main Light Measurement Results

Output

Efficiency

Peak Intensity and Beam Angle

Color Rendering Index

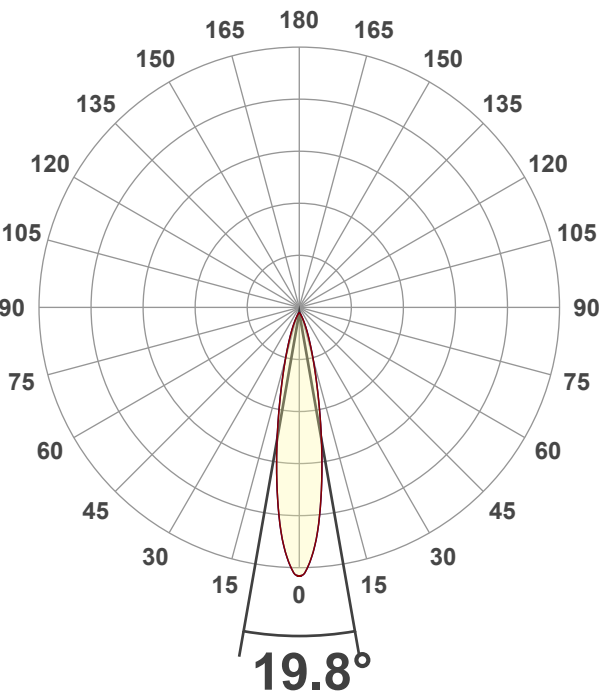
1065 lm

67 lm/W

6028 cd – 19.8°

CRI 92.8

Light Intensity Distribution



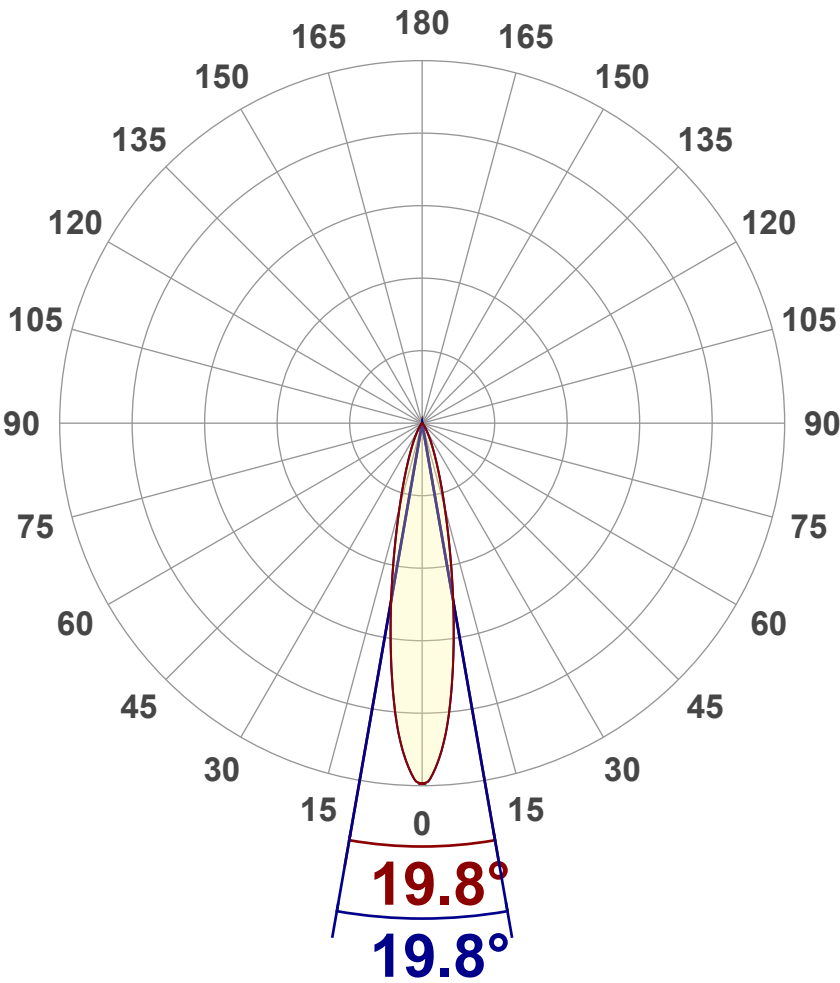
Goniophotometry Report

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Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1065 lm
Peak Intensity	6028 cd
Beam Angle (50%)	19.8°
Beam Angle (90%)	19.8°
Beam Angle (10%)	19.8°

Cut-off Angle

Average 2,5%	61°
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Field Angle

Average 10%	42.1°
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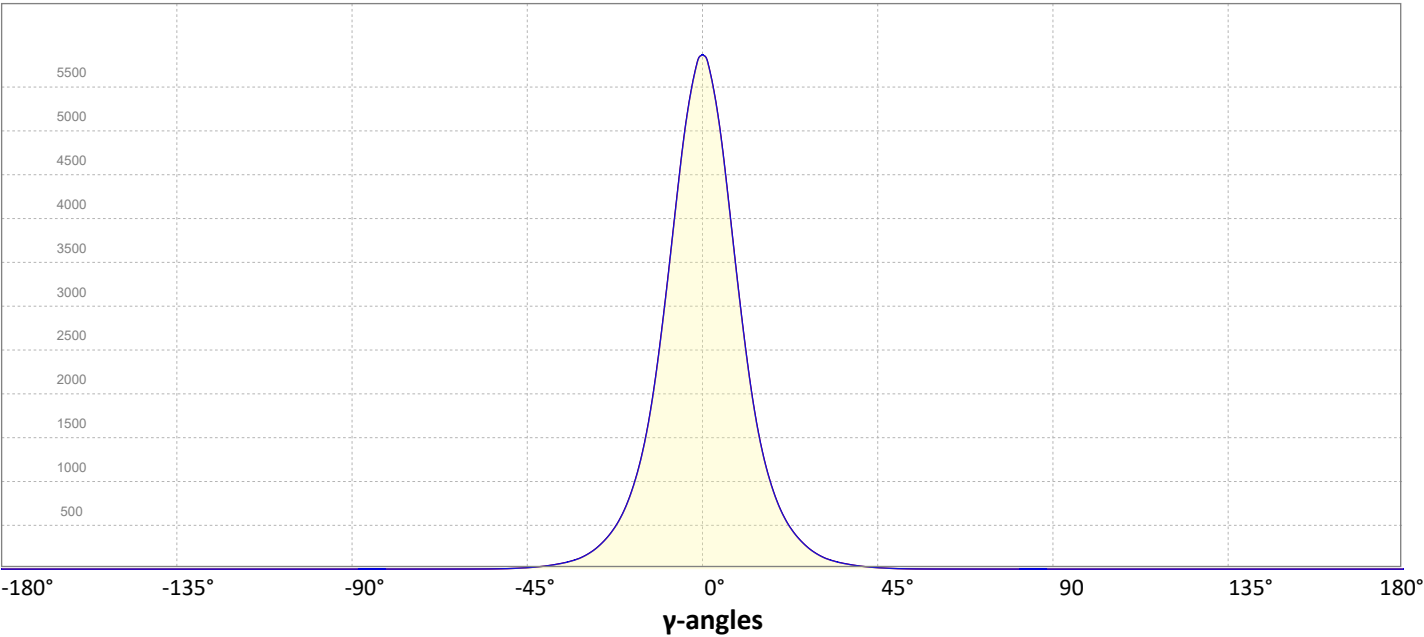
Intensity Ratio

In 120° cone	99.4%
In 90° cone	98.8%

C000-C180

C090-C270

Linear distribution diagram - Intensity (candela) vs γ-angle

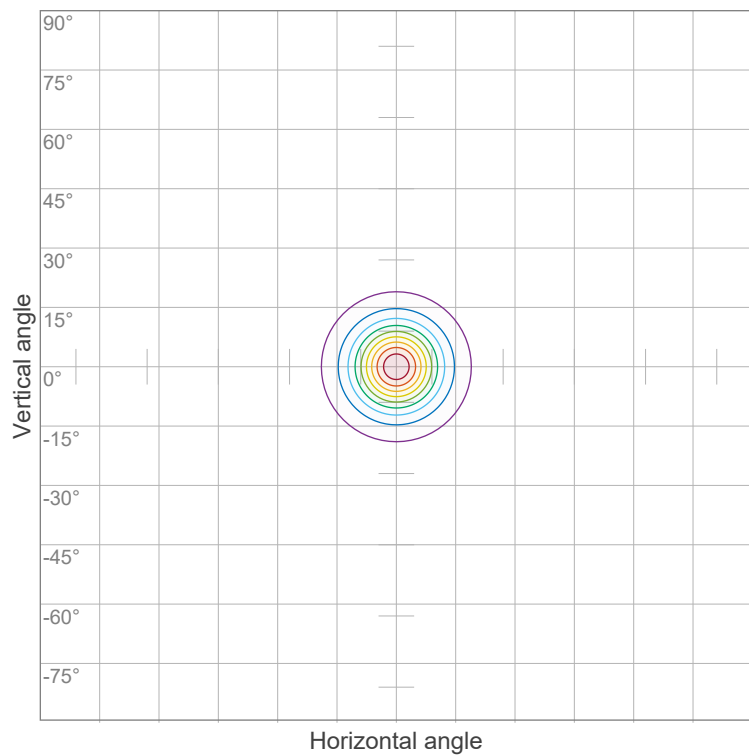


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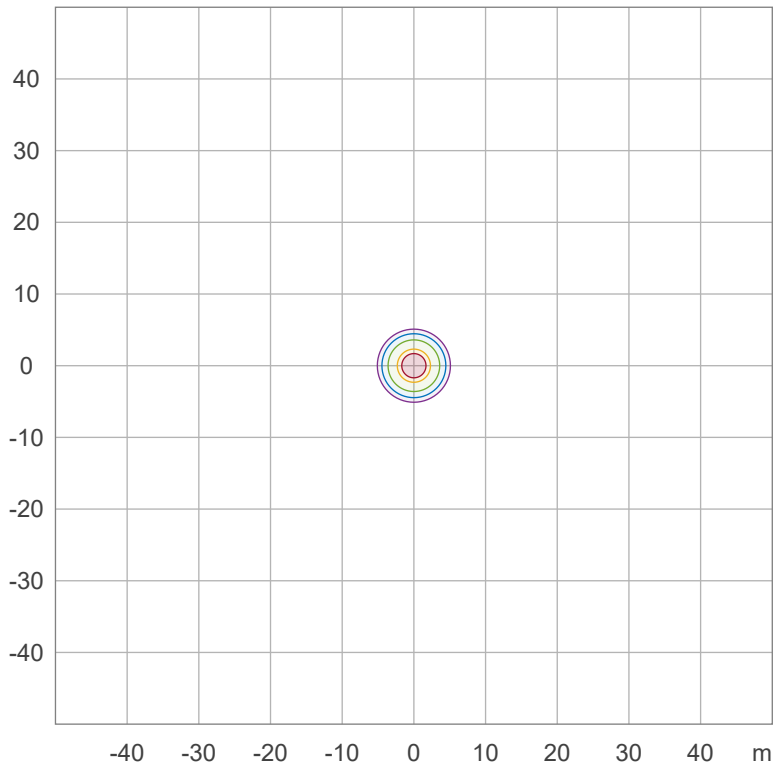
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Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)

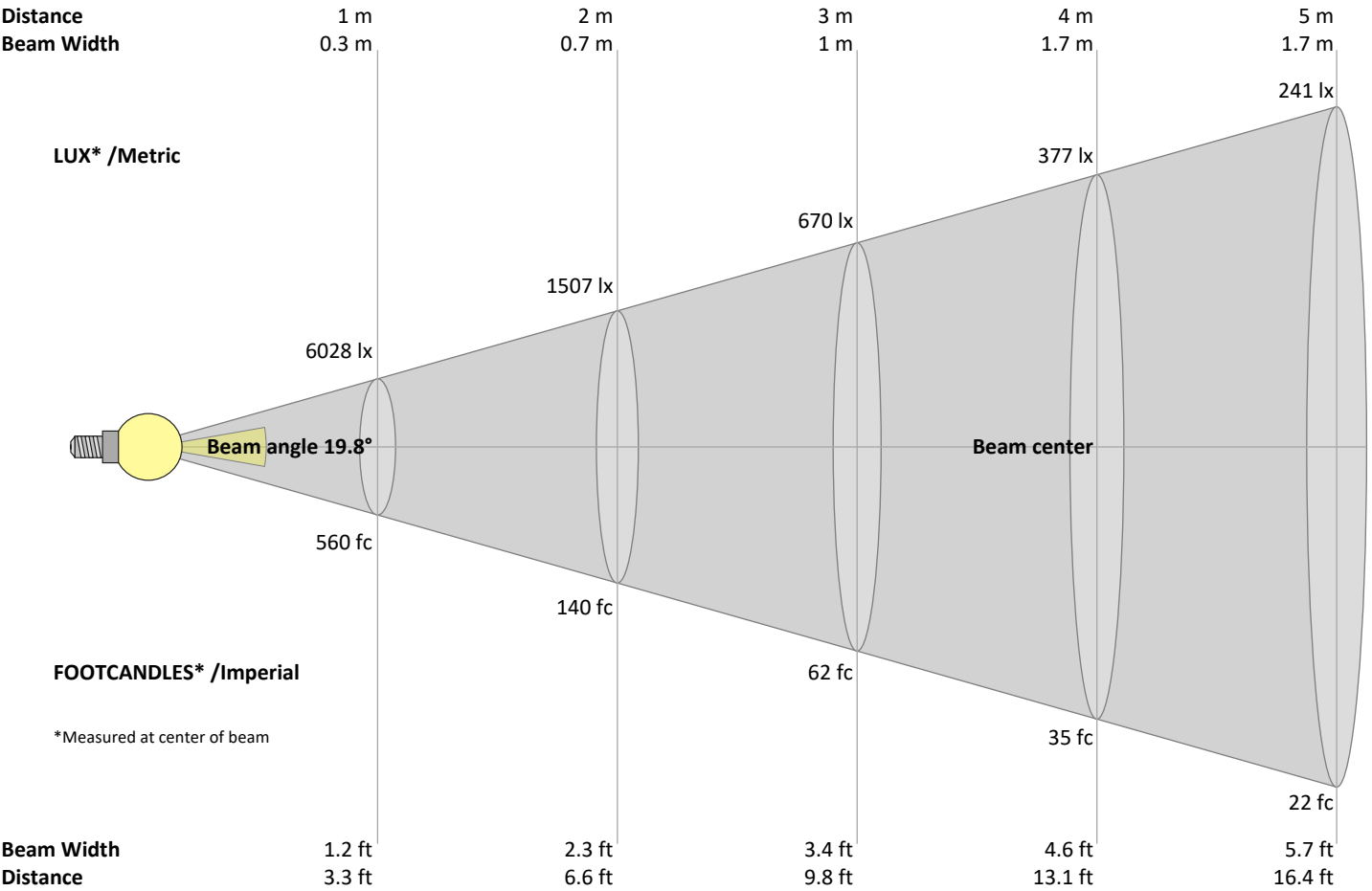


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Beam Details



Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6	ft
6028	1507	670	377	241	167	123	94	74	60	50	42	36	31	27	24	21	19	17	15	lux
560	140	62.2	35	22.4	15.6	11.4	8.8	6.9	5.6	4.6	3.9	3.3	2.9	2.5	2.2	1.9	1.7	1.6	1.4	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
6028	5816	5309	4594	3777	2982	2270	1692	1260	942	702	526	397	298	220	163	120	91	71	53	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
6028	5816	5309	4594	3777	2982	2270	1692	1260	942	702	526	397	298	220	163	120	91	71	53	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
6028	5816	5309	4594	3777	2982	2270	1692	1260	942	702	526	397	298	220	163	120	91	71	53	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
6028	5816	5309	4594	3777	2982	2270	1692	1260	942	702	526	397	298	220	163	120	91	71	53	cd
100%	96%	88%	76%	63%	49%	38%	28%	21%	16%	12%	9%	7%	5%	4%	3%	2%	2%	1%	1%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
	p Ceiling	70	70	50	50	30	70	70	50	50	30
	p Walls	50	30	50	30	30	50	30	50	30	30
	p Floor	20	20	20	20	20	20	20	20	20	20
Room size											
H = mounting height above eye level											
X	Y	Viewed Crosswise (Viewing direction orthogonal to lamp length axis)					Viewed Endwise (Viewing direction parallel to lamp length axis)				
2H	2H	10.1	10.5	10.1	10.7	10.9	10.1	10.5	10.1	10.7	10.9
	3H	9.8	10.4	10.2	10.6	10.7	9.8	10.4	10.2	10.6	10.7
	4H	9.8	10.3	10.2	10.6	10.8	9.8	10.3	10.2	10.6	10.8
	6H	9.8	10.3	10.1	10.6	10.9	9.8	10.3	10.1	10.6	10.9
	8H	9.9	10.3	10.2	10.6	11.0	9.9	10.3	10.2	10.6	11.0
	12H	9.9	10.3	10.2	10.7	11.1	9.9	10.3	10.2	10.7	11.1
4H	2H	9.7	10.3	10.1	10.5	10.7	9.7	10.3	10.1	10.5	10.7
	3H	9.7	10.1	10.0	10.5	10.9	9.7	10.1	10.0	10.5	10.9
	4H	9.6	10.0	10.0	10.4	10.9	9.6	10.0	10.0	10.4	10.9
	6H	9.6	10.1	10.1	10.4	10.8	9.6	10.1	10.1	10.4	10.8
	8H	9.7	10.1	10.2	10.4	10.8	9.7	10.1	10.2	10.4	10.8
	12H	9.8	10.1	10.3	10.5	11.0	9.8	10.1	10.3	10.5	11.0
8H	4H	9.5	9.9	10.0	10.2	10.6	9.5	9.9	10.0	10.2	10.6
	6H	9.6	9.9	10.1	10.3	10.9	9.6	9.9	10.1	10.3	10.9
	8H	9.8	10.0	10.3	10.5	11.1	9.8	10.0	10.3	10.5	11.1
	12H	10.0	10.2	10.6	10.7	11.3	10.0	10.2	10.6	10.7	11.3
12H	4H	9.4	9.8	9.9	10.2	10.6	9.4	9.8	9.9	10.2	10.6
	6H	9.7	9.9	10.2	10.4	11.0	9.7	9.9	10.2	10.4	11.0
	8H	9.8	10.0	10.4	10.5	11.1	9.8	10.0	10.4	10.5	11.1

Variations with the observer position for the luminaire spacings, S:

S = 1.0H	4.2 / -4.0	4.2 / -4.0
S = 1.5H	6.7 / -4.3	6.7 / -4.3
S = 2.0H	8.6 / -4.6	8.6 / -4.6

Coefficients of Utilization

Ceiling reflectance	80			70			50			30			10			0		
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR		(RCR: Room Cavity Ratio)			Room Values are expressed as percentage of Lumen delivered to the task surface													
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	115	113	111	109	113	111	109	107	107	105	104	103	102	101	99	99	98	96
2	111	107	104	102	109	106	103	101	103	100	99	100	98	96	97	96	94	93
3	108	103	99	96	106	102	98	96	99	96	94	97	94	93	95	93	91	90
4	104	99	95	92	103	98	94	91	96	93	90	94	91	89	92	90	88	87
5	101	95	91	88	100	94	90	88	93	89	87	91	88	86	90	87	85	84
6	98	92	88	85	97	91	87	84	90	86	84	89	86	83	87	85	83	82
7	95	89	85	82	94	88	84	82	87	84	81	86	83	81	85	83	80	79
8	93	86	82	79	92	86	82	79	85	81	79	84	81	79	83	80	78	77
9	90	84	80	77	90	83	79	77	83	79	77	82	79	76	81	78	76	75
10	88	81	77	75	87	81	77	75	80	77	75	80	77	74	79	76	74	73

Goniophotometry Report

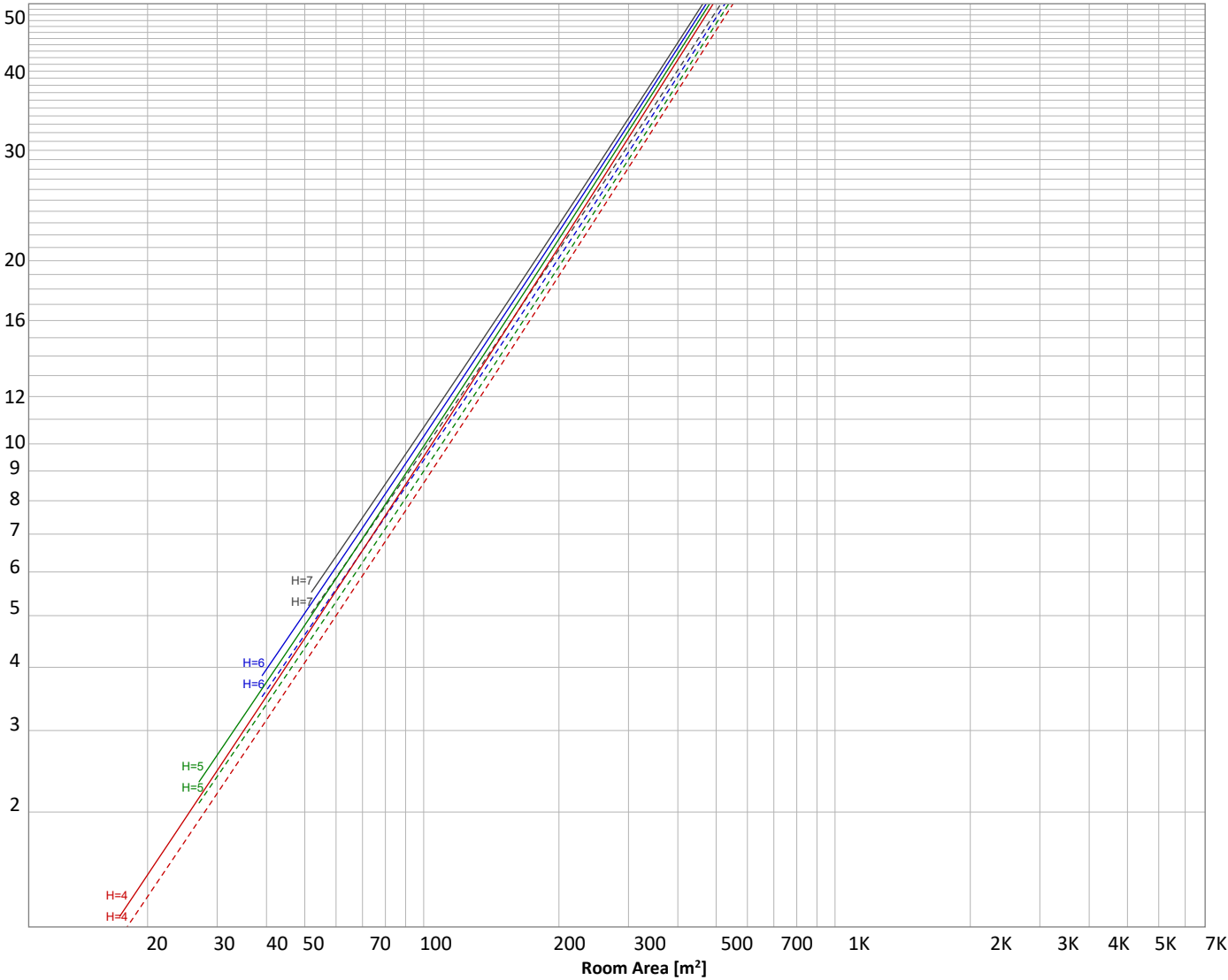
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Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1065 lm	p(%)		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = Average lux on work area =	100 lx	-----	50	30
				Floor reflectance
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
408 lm	416 lm	165 lm	53.2 lm	14.5 lm	2.60 lm	1.25 lm	1.03 lm	0.801 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0.498 lm	0.483 lm	0.453 lm	0.410 lm	0.353 lm	0.287 lm	0.211 lm	0.129 lm	0.044 lm

Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	408 lm	38.3%
10-20°	416 lm	39.1%
20-30°	165 lm	15.5%
30-40°	53 lm	5.0%
40-50°	14 lm	1.4%
50-60°	3 lm	0.2%
60-70°	1 lm	0.1%
70-80°	1 lm	0.1%
80-90°	1 lm	0.1%
90-100°	0 lm	0.0%
100-110°	0 lm	0.0%
110-120°	0 lm	0.0%
120-130°	0 lm	0.0%
130-140°	0 lm	0.0%
140-150°	0 lm	0.0%
150-160°	0 lm	0.0%
160-170°	0 lm	0.0%
170-180°	0 lm	0.0%
Total	1065 lm	100.0%

Intensity peaks

Max intensity	6028 cd
Intensity, 90°	0 cd
Intensity, 0°	6028 cd

Zonal Lumen summary

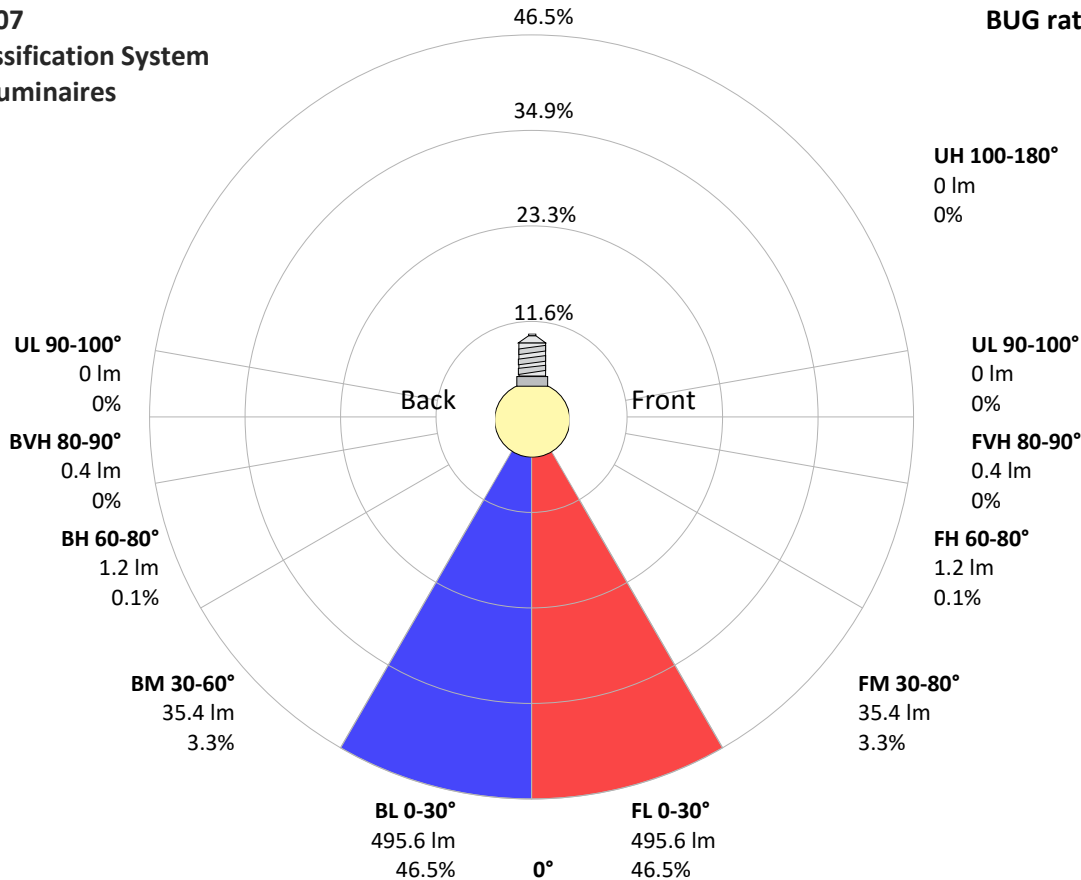
Zone (γ)	Lumen	% Total
0-30°	989 lm	92.8%
0-40°	1042 lm	97.8%
0-60°	1059 lm	99.4%
60-90°	3 lm	0.3%
70-100°	2 lm	0.2%
90-120°	1 lm	0.1%
0-90°	1062 lm	99.7%
90-180°	3 lm	0.3%
0-180°	1065 lm	100.0%

BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	496 lm	46.5%
Medium(30-60°)	35 lm	3.3%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
Back light		
Low(0-30°)	496 lm	46.5%
Medium(30-60°)	35 lm	3.3%
High(60-80°)	1 lm	0.1%
Very high(80-90°)	0 lm	0.0%
Uplight		
Low(90-100°)	0 lm	0.0%
High(100-180°)	0 lm	0.0%

IESNA TM-15-07
Luminaire Classification System
For Outdoor Luminaires

BUG rating B1 U1 G0



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Power Details

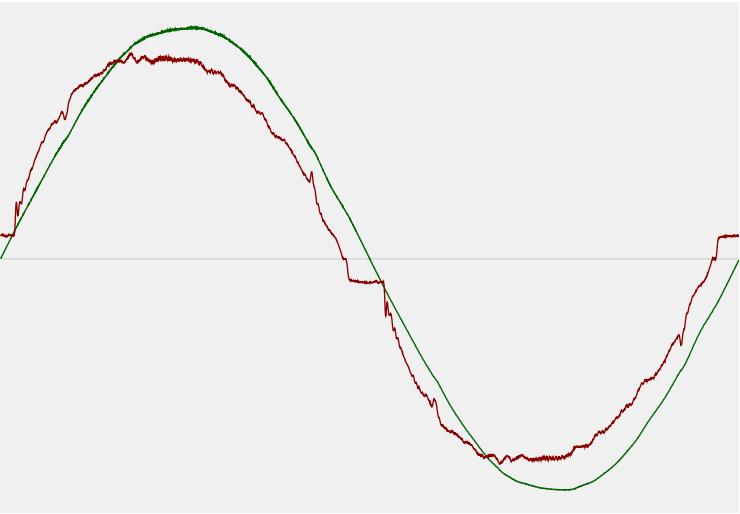
Input Power

Power feed to light source	16.0 W
Frequency of input power	50.1 Hz
RMS Input voltage feed, V_{RMS}	240 V
RMS Input current feed, I_{RMS}	0.068 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	16.3 VA
Displacement factor of AC power feed	0.98
Power factor of AC current feed	0.98
Total harmonic distortion of the current	6.37%
Total harmonic distortion of the voltage	0.99%

Efficiency

Radiated power efficiency	24.4%
Lumen efficiency	67 lm/W

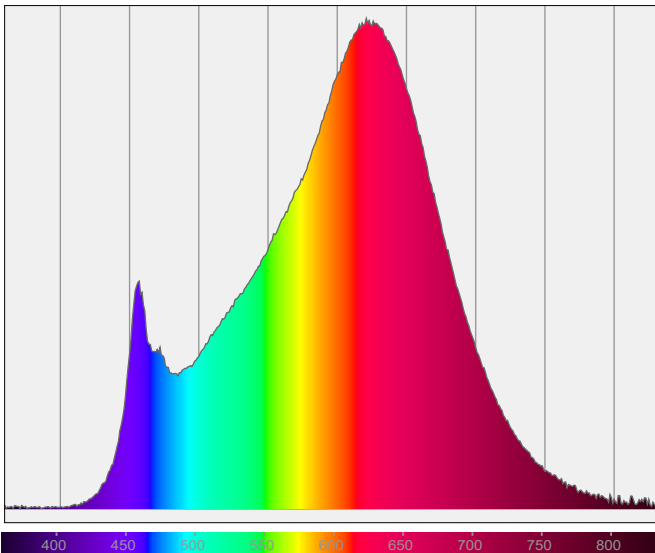
Input Power Curve



Color Measurements

Correlated Color Temperature	CCT = 2700 K
Color Rendering TM30-18	R _f 91.4 — R _g 98.9
Color Shift, CIE duv	Duv ±0.0003

Spectral distribution



Color details

Correlated Color Temperature	CCT = 2700 K	Color coordinates CIE 1931	(x;y) = (0.460;0.411)
Color Rendering Index	CRI 92.8	Color coordinate CIEs 1960	(u;v) = (0.263;0.352)
Color Rendering Index, R9 (red component)	R9 = 66.7	Color deviation from BBL	Duv = ±0.0003
Color Rendering TM30-18	R _f 91.4 — R _g 98.9	Color coordinate CIEs 1976 (CIELUV)	(u';v') = (0.263;0.263)
Color Quality Scale	CQS = 90.7		

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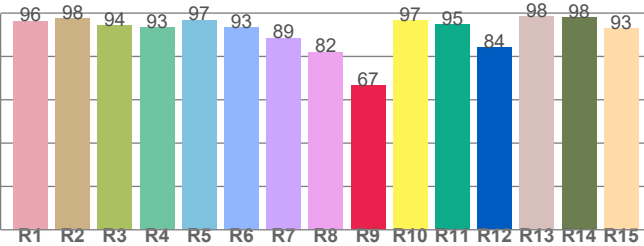
CIE 1931



CIE 1931 – zoomed on Planckian locus



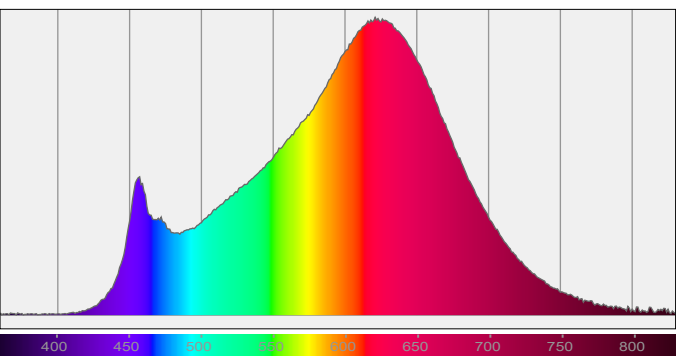
Color Rendering Index per reference color (CIE 1995)



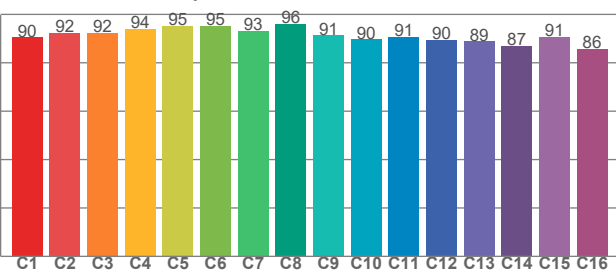
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
96.5	97.7	94.2	93.3	96.9	93.3	88.5	82.1	66.7	96.8	94.7	84.3	98.4	98.0	93.0

Spectral power distribution (SPD) / W/nm – 0-100%



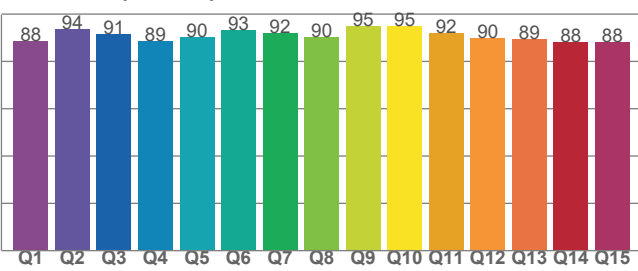
TM30-18 Rf-values per hue bin



TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
90.4	92.4	92.2	94.0	95.2	95.1	93.3	95.9	91.2	89.6	90.7	89.5	88.7	87.0	90.8	85.6

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
88.5	93.8	91.5	88.7	90.2	93.1	92.0	90.2	94.7	95.1	92.2	90.0	89.3	88.2	88.2